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DATA ON VENTILATION

*Supplementary to Section II of "Scientific
Office Management" by W. H. Leffingwell*

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DATA ON VENTILATION

The story of the Black Hole of Calcutta is familiar to all of us, but its lesson has not yet been universally learned. The necessity of fresh air has been shown by the tuberculosis agitation and nearly everyone knows that pure fresh air is an absolute necessity for life. Many business men have, however, not yet applied to their offices the logical conclusion from these well-known facts. If fresh air is necessary for life, it must certainly be necessary for good work.

There have been many contradictory theories of ventilation, none of which however has denied the necessity of pure, fresh air for efficient work. They have all revolved around the question as to just what were the harmful elements in impure air.

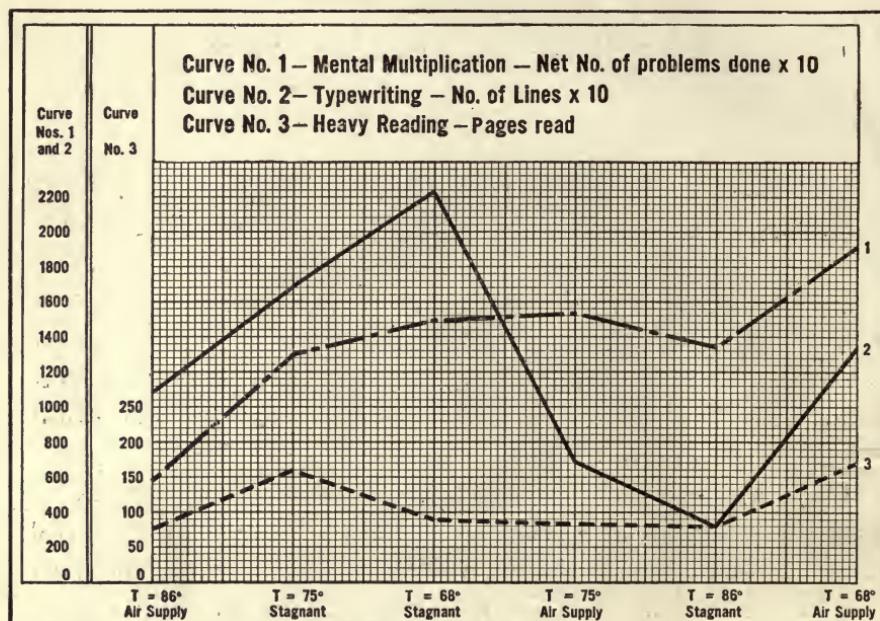
Through the work done by municipalities in ventilating schoolrooms, the methods of thoroughly ventilating large rooms occupied by many people have for many years been well known. Even so, this knowledge has perhaps rarely been used outside of schoolrooms and theaters, where ventilation may be compulsory.

Kendall Banning tells about one company which found that every cold contracted by its employees cost twenty-four dollars. It is well known that colds are often due to improper ventilation.* Another company, manufacturing straw hats in Baltimore, found that the percentage of sickness during two winters was 27.5. An investigation revealed defects in the ventilation and heating system. Proper ventilation was provided and the percentage of sickness dropped to seven.

Although one manager thinks the estimate of four per cent increase in efficiency is perhaps too low, let's suppose there

* "Figures to Prove That Ventilation Pays," by Kendall Banning, *SYSTEM*, Volume XXX, No. 3

were one hundred clerks getting an average wage of six hundred dollars a year, which means an annual payroll of sixty thousand dollars. Four per cent of this would be two thousand four hundred dollars, a sum sufficient to pay for a very elaborate ventilating system.



HOW ATMOSPHERIC CONDITIONS AFFECT OFFICE WORKERS

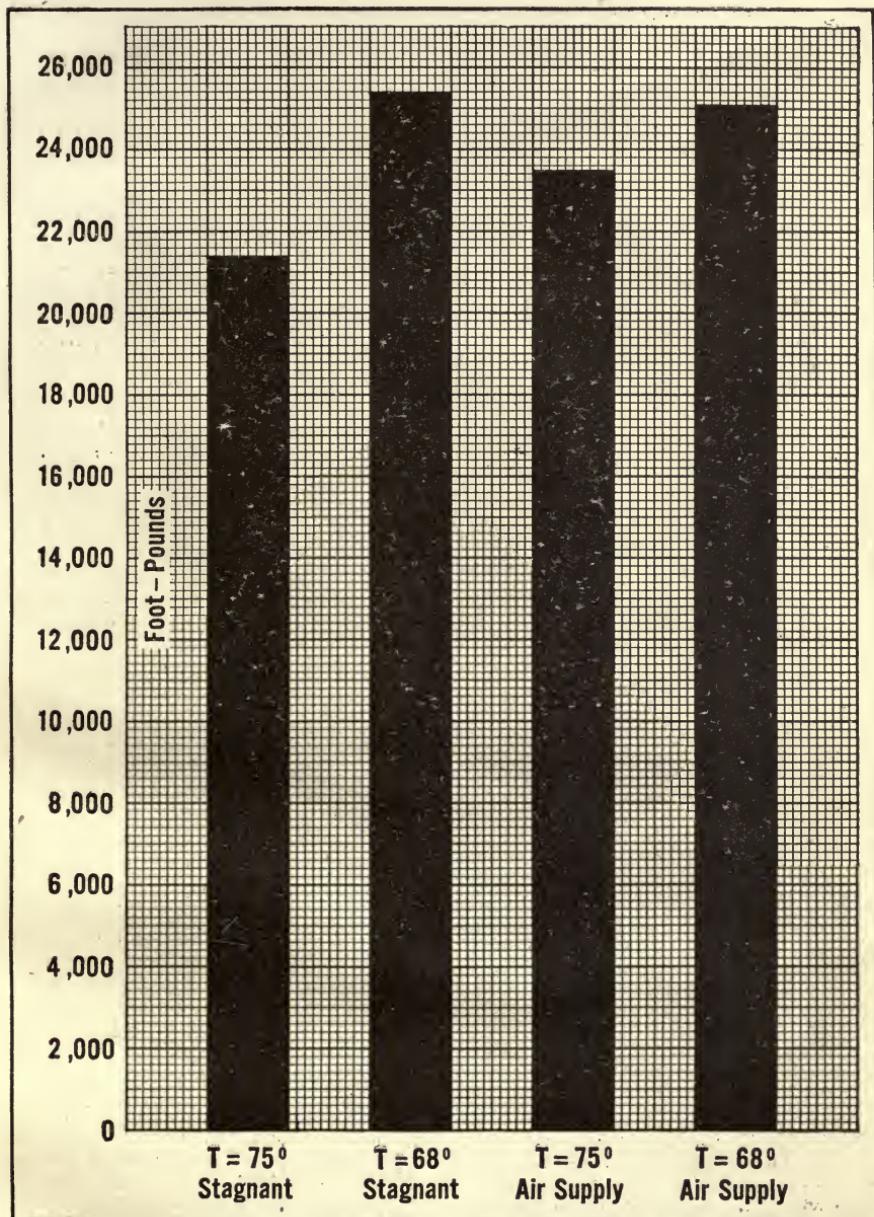
The graph shown above, together with the one on the next page, shows the results of tests made by the New York State Commission on ventilation. One of the conclusions arrived at, as indicated by this graph, is that the air a worker breathes has a direct bearing upon his capacity as expressed in the output

It is quite true, of course, that many offices are located in old-fashioned buildings not provided with ventilating systems. For these it is perhaps well to mention a few makeshifts that are certainly better than nothing at all, if renovating is considered too expensive.

First is the electric fan. It has been demonstrated that air that is in circulation is much better than stagnant air. The one drawback to the electric fan is that it also stirs up particles of dust under certain conditions.

Then there is the window ventilator. The window itself as a ventilator is lacking, but there are ventilators which deflect the cold air upward. By leaving the window open a few inches

fresh air is admitted. Fresh air, however, is not always pure air, especially in large cities. Perhaps another problem to be met in using ventilators of this sort is that on cold days the



AIR AND THE INCLINATION TO WORK

A group of men on whom the tests were made did 37% more of precisely the same work at 68 degrees than they did at 86 degrees under exactly similar conditions. This finding would seem to warrant the conclusion that a temperature of 68 degrees is perhaps the most desirable in an office

employees sitting next to them often close them because the cold air is too uncomfortable.

Perhaps one of the most effective makeshift ventilators is a simple exhaust fan which exhausts the stagnant air in the room. This air must be replaced by other air which comes in from the outside at every opportunity, through the windows and doors, but does not come in at any one place in sufficient volume to cause uncomfortable drafts.

A comparatively cheap ventilating system is one which pumps in enough fresh air from the outside, passes it over steam coils, and heats it before it enters the room. A system like this, capable of heating and ventilating an office of one hundred people, can be installed for a surprisingly small sum.

Here is an interesting list of resolutions passed by the Chicago Commission on Ventilation, which reduced its findings to specific terms by means of them:

1. That carbon dioxide, as encountered in working practice, is not the harmful agent of major importance in expired air or air otherwise contaminated.

2. That a temperature of 68 degrees Fahrenheit with a proper relative humidity is the proper maximum temperature for living rooms artificially heated.

3. That in the present state of knowledge it is impossible to designate all harmful factors in or associated with expired air.

4. That the principle of ventilation by currents is preferable to the principle of ventilation by dilution.

5. That for adequate ventilation, smaller volumes of air suffice when introduced by currents than when introduced by dilution.

6. That ventilation which utilizes the principle of convection in producing currents is more effective and economical than that which neglects this principle.

7. That upward ventilation currents in crowded rooms are desirable, provided the sources of air supply are free from contamination.

8. That in making use of upward ventilation, attention should be given to the counteracting of wall and window chill.

9. That in those processes of manufacture where considerable CO₂ is

liberated, the CO₂ content is not a proper index of air pollution.

10. That for the removal of kitchen odors, body odors, stable odors, and other odors associated with heat production, upward ventilation is more efficient than downward ventilation.

11. That the delivery of a certain volume of air per unit of time, per occupant, into a given space does not necessarily constitute ventilation.

12. That air which is introduced into an occupied room in such a way that it strikes the occupants should be not lower in temperature than 60 degrees Fahrenheit.

13. That heating and ventilating are two distinct problems, and, therefore, the installation of heating and ventilating systems, whether separate or combined, should be such that neither system shall interfere with the efficiency of the other.

14. That from the standpoint of health, relative humidity is one of the important factors in ventilation.

15. That efficient air cleaning devices are desirable in all ventilating installations where the air supply is liable to be contaminated by dust or other objectionable matter.

16. That the bacterial content of the air is an important factor in all ventilation, and bears a direct relation to the source and quantity of the air supply.

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